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DANA* MODEL 0001 D.C. Preamplifier

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Dana Laboratories, Inc.

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INTRODUCTION

The Dana Model 0001 D. C. Preamplifier is a signal conditioning plug-in circuit card for use with Dana Series 4000 or 5000 Digital Voltmeters (DVM's).

When inserted in a DVM which is properly wired, it allows millivolt signals to be measured with the normal voltmeter leads. The 0001 is contained within and derives its power supply voltages from the DVM. The guarded input characteristics of the Dana DVM are retained for millivolt measurements. Full one digit resolution is maintained when the preamplifier is used.

PRELIMINARY SPECIFICATIONS

Model 0001 - D.C. Preamplifier

Function	Amplifies very small dc signals to increase the sensitivity of the DVM; all specifications refer to DVM output as a function of input voltage
Ranges:	± 10; ± 100; ± 1000 millivolts full scale
Resolution on Most Sensitive Range	0.1 microvolt per digit (Series 5000 DVM) 1.0 microvolt per digit (Series 4000 DVM)
Accuracy	0.02% of reading or 0.01% of full scale of range, with zero adjustment set correctly
Zero Stability	± 5 microvolts for one year
Input Resistance	100 megohms minimum, all ranges
Range Control.	Automatic with manual override, selected by DVM front panel knob
Decimal Point Indication	Automatic; displayed in millivolts
Function Control	Preamplifier is inserted between signal and DVM by selecting "millivolt" position of function selector
Measuring Time	DC voltage measuring time plus 1 second on fixed range and polarity; dc measuring time plus 3 seconds worst case polarity and range change;
Isolation	Preamplifier input is isolated and guarded from ground, ac power line and electrical output
Size and Mounting	Preamplifier is wholly enclosed within Dana series 4000/5000 DVM; there are no additional cables, connectors, or controls

OPERATION

When the Model 0001 is installed in a Dana DVM, millivolt measuring capability is available using the normal input leads. Operation of the DVM for millivolt measurements is much the same as for standard D.C. measurements, since the normal guarded input circuit, and all automatic features are available.

To activate the preamplifier, the function switch is placed in the "Millivolt" position. Automatic ranging may then be selected as in standard D.C. operation, or if desired, the instrument may be manually placed on the 10, 100 or 1000 millivolt position. The 1 millivolt range is not operational and should not be used as this position of the range switch is used only with A.C. Converters and Ohms Converters. It is also a valid position for the 4000 series DVM's when the selected function is "DC volts" or "Ratio X10".

Any of the standard mode positions may be selected when measuring millivolts; however, they will react, or in some cases appear to react, somewhat differently. These differences are described below.

Periodic.	When polarity and range changes are not required, operation will be normal and periodic measurements will be made at the repetition rate determined by the specific DVM in use; however, when a range or polarity change occurs, the "time out" circuits in the DVM (set for approximately 1.0 seconds in "Millivolt" function) will inhibit read commands to permit the preamplifier to settle and avoid erroneous readings.
Command.	Operation is normal but sampling will not necessarily commence immediately if ranging or polarity changes are required. (refer above time delays).
Auto Threshold.	Operation is identical to standard D.C. operation.
Manual Threshold.	Operation is normal but due to the extreme sensitivity of the system, the operator may find it necessary to increase the threshold level more often than on standard D.C. measurements.

The preamplifier is factory adjusted for minimum offset. However, the operator may wish to readjust the zero control occasionally to compensate for thermal potentials generated in a given test setup. The zero control is located on the front of the Preamplifier, readily accessible behind the right front panel section. The card is located in card position number 26 (2nd card position from extreme right). The adjustment should be made only after the DVM and all associated input circuits have achieved thermal stability. To illustrate the importance of the latter, set the DVM to the 10 millivolt range and short the input probes. After the instrument has arrived at a balanced condition, take hold of the test probes and observe the change in reading as the test probes heat.

The Model 0001 was designed for on-the-line applications, and therefore is as foolproof as is consistant with performance requirements. Fusing being impractical due to thermal problems, the instrument was designed to withstand sustained overloads up to 10 volts. Although higher voltages can be tolerated for short periods of time, the operator should exercise care to see that the 10 volt rating is not exceeded.